

**IMPLEMENTATION PROS AND CONS BETWEEN
ASYNCHRONOUS TRANSFER MODE (ATM)
AND
GIGABIT ETHERNET (GbE)**

A thesis submitted to the Graduate School in partial
fulfillment of the requirements for the degree
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Abstrak

Peningkatan permintaan terhadap keupayaan menghantar data melalui peningkatan bilangan pengguna dan penggunaan aplikasi intranet dan multimedia menyebabkan rangkaian komputer masa kini tidak dapat berfungsi dengan cekap. Di antara teknologi rangkaian yang cuba memenuhi permintaan diatas ialah Asynchronous Transfer Mode (ATM) dan Gigabit Ethernet (GbE). Teknologi tersebut bersaing hebat untuk mendominasi pasaran teknologi rangkaian.

Teknologi Gigabit Ethernet direkabentuk bertujuan mengutamakan prestasi **dan** perkembangan rangkaian. Ia akan diimplimentasikan di rangkaian setempat berbagai saiz. Teknologi tersebut akan membolehkan peningkatan drastik dalam keupayaan pencapaian pengguna terhadap aplikasi rangkaian. Apabila rangkaian komputer dinaikkan taraf kepada keupayaan menghantar data sebanyak gigabit, membolehkan rangkaian tersebut memberi perkhidmatan kepada ramai pengguna **tanpa** penurunan prestasi.

Kelebihan ATM ialah kepantasan dan fleksibilitinya. ATM membolehkan rangkaian komputer menghantar dan menerima sebanyak gigabit dalam satu saat. Kelebihan ATM ialah teknologi tersebut membolehkan pengguna transmit maklumat **VIViD** hanya melalui satu medium. Satu lagi kelebihanya ialah bandwidth diberikan semasa transmisi berlaku sehingga trasmisi tersebut **tamat** membolehkan ATM dapat menyokong sebarang aplikasi.

Kenyataannya ATM dan Gigabit Ethernet bukan suatu teknologi yang boleh saling digantikan dengan satu **sama lain**. Setiap teknologi mempunyai kelebihan masing-masing dan hanya mampu menyokong appiikasi tertentu sahaja. Contohnya, Gigabit Ethernet akan digunakan dalam rangkaian komputer yang kini menggunakan Fast Ethernet dan FDDI yang tidak mampu menyokong bandwidth yang diperlukan untuk transmisi data. Dalam perkataan lain, Gigabit Ethernet hanya diimpiimentasikan dalam rangkaian komputer

yang memerlukan keupayaan bandwidth yang besar tetapi tidak mengutamakan kualiti servis.

ATM pula akan digunakan dalam persekitaran yang mengutamakan kepantasan dan ketepatan penghantaran seperti video, suara dan sebagainya. Aplikasi-aplikasi ATM mula diimplimentasikan dalam persekitaran rangkaian luas (WAN). Keadaan ini mungkin membolehkan rangkaian komputer menggunakan ATM dalam rangkaian setempat (LAN) dan rangkaian luas (WAN) atau mungkin menggunakan Gigabit Ethernet untuk menghantar trafik rangkaian setempat dan ATM menghantar trafik rangkaian luas.

Abstract

Growing demands for bandwidth spurred by increasing numbers of users and data-intensive office, intranet and multimedia applications are adding a significant burden to backbones in many of today's networks. Several technologies have emerged to meet these demands. The two dominant technologies competing for dominance in the network backbone are Asynchronous Transfer Mode (ATM) and Gigabit Ethernet (GbE)

Designed to offer higher performance and scalability, Gigabit Ethernet will be implemented in general-purpose LANs of all sizes. The technology will provide dramatic increases in the bandwidth available for users to access servers and applications. When a backbone is upgraded to gigabit throughput, a network can support a marked increase in the numbers of segments and nodes it supports without degrading performance.

It's a bi-directional, full-duplex switched technology. The greatest advantages of ATM are its speed and flexibility. ATM boasts gigabit-per-second transfer rates. However with the growing speed of other protocols, ATM's biggest selling point is that it can transport all VIViD information over a single-medium. Another feature is that bandwidth is provided on the fly, providing enough to support any given application and is only assigned until transmission is complete. No single user can monopolize an ATM channel.

In reality, ATM and Gigabit Ethernet are not equal substitutes for each other and should not be considered as such. Each technology is appropriate for specific applications. Simply stated, Gigabit Ethernet will be deployed in areas where Fast Ethernet and other technologies like FDDI are no longer able to provide the bandwidth needed for pure data traffic. In other words, Gigabit Ethernet will be used in areas where high data throughput is required, but quality of service is not a main concern. ATM will be used in environments where video, voice and other delay sensitive traffic exist. Some applications for ATM are also starting to be implemented in the WAN.

This could lead to networks that use ATM in the LAN and WAN, or possibly networks that use Gigabit Ethernet to carry LAN traffic and ATM to carry WAN traffic.

Table of Contents

	Page
PERMISSION TO USE.....	i
ABSTRACT (BAHASA MALAYSIA).....	ii
ABSTRACT (ENGLISH).....	iv
TABLE OF CONTENTS.....	vi
LIST OF TABLES.....	xi
LIST OF FIGURES.....	xii
 CHAPTER ONE : INTRODUCTION	
1.1: Today's Requirements of computer Networks.....	1
1.2: Problem Statements.....	3
1.3: Intended Audiences.....	4
 CHAPTER TWO : INTRODUCING ATM	
2.1: ATM Network Interfaces.....	6
2.2: ATM Cell-Header Format.....	7
2.3: ATM Services.....	8
2.4: ATM Switching Operations.....	9
2.5: ATM Reference Model.....	10
2.6: ATM Physical Layer.....	11
2.7: ATM Adaptation Layer.....	12
2.8: ATM Adaptation Layers : AAL1.....	14
2.9: ATM Adaptation Layer : AAL 2.....	15
2.10: ATM Adaptation Layers : AAL 3 / 4.....	15
2.11: ATM Adaptation Layers : AAL 5.....	17
 CHAPTER THREE : INTRODUCING GbE	
3.1: GbE Protocol Architecture.....	18
3.2: Physical Layer.....	20
3.2.1: 150 Ohm Balanced Shielded Copper Cable (1000BaseCX).....	22
3.2.2: The Serializer / Deserializer.....	23
3.2.3: 8B / 10B Encoding.....	23
3.2.4: GbE Interface Carrier (GBIC).....	25
3.3: The MAC Layer.....	25
3.3.1: Half-Duplex Transmission.....	26
3.3.2: IEEE 802.3x Full-Duplex Transmission.....	27
3.4: The Logical Link Layer.....	28
3.5: Conclusion.....	29

CHAPTER FOUR : ATM IMPLEMENTATION

4.1:	Design Goals.....	30
4.2:	Characteristics.....	31
4.3:	Integrating ATM Across the Enterprise Data Networks.....	32
4.4:	Accommodating Bursty and Real-Time Communications.....	33
4.5:	The role of Edge Devices.....	35
4.6:	ATM LAN Emulation.....	36
	4.6.1: LANE Components.....	38
	4.6.2: LANE Virtual Channel Connections.....	39
	4.6.3: LANE Operations.....	40
	4.6.4: A Conceptual View of LAN Emulation.....	42
	4.6.5: LAN Emulation in Practice.....	43
	4.6.6: Multiple emulated LANE.....	44
	4.6.7: ATM Virtual LANs.....	46
	4.6.8: The Routing Future of ATM Virtual LANs	47
	4.6.9: Scaling Up to ATM.....	47
	4.6.10: Integrating ATM into the Campus and WAN Backbones.....	48
	4.6.10.1: Integrating Checklist ATM Campus and WAN Backbones.....	49
	4.6.11: Integrating ATM into the Building Backbone, workgroups and Server Farm...	50
	4.6.11.1: Integrating Checklist for ATM in the Building and Server Farm.....	51
4.7:	Integrated Services Internet.....	52
4.8:	IP over ATM.....	53
	4.8.1: Packet Encapsulation.....	53
	4.8.2: Address Resolution.....	54
4.9:	ATM to the Desktop.....	55
4.10:	25.6 Mbps ATM.....	57
4.11:	Application Programming Interface.....	58
4.12:	ATM Routing Protocols.....	59
4.13:	Multiprotocol over ATM (MPOA).....	60
4.14:	Integrated Private Network-to-Network Interface (I-PNNI).....	61
4.15:	Conclusion.....	62

CHAPTER FIVE : GbE IMPLEMENTATION

5.1:	Introduction.....	66
5.2:	Need for Networking Speed.....	67
5.3:	Gigabit Ethernet is on the Way.....	68
5.4:	Meeting the Networking Challenge.....	71
	5.4.1: Raw Bandwidth.....	71
	5.4.2: Price / Performance.....	73
	5.4.3: Seamless Migration.....	74
	5.4.4: Simplified Management.....	74
	5.4.5: Investment Protection.....	75
5.5:	Complements ATM and Other Advanced Technologies.....	75
5.6:	Gigabit Ethernet migration.....	76
	5.6.1: Upgrading Switch-to-Switch Connections..	77
	5.6.2: Upgrading Switch-to-Server Connections..	78
	5.6.3: Upgrading a Switched Fast Ethernet.....	80
	5.6.4: Upgrading a Shared FDDI Backbones.....	81
	5.6.5: Upgrading High Performance Workgroups.....	83
5.7:	A New Era for Ethernet.....	84

CHAPTER SIX : ATM vs GbE

6.1:	Introduction.....	86
6.2:	Low Cost.....	87
6.3:	Ease of migration.....	87
6.4:	Speed.....	88
6.5:	Scalability.....	89
6.6:	Flexibility.....	89
6.7:	Application Support.....	90
6.8:	Quality of Service (QoS).....	92
6.9:	Wiring.....	92
6.10:	Protocols.....	93
6.11:	Comparison of ATM and Gigabit Ethernet.....	93
	6.11.1: Advantages of ATM.....	94
	6.11.2: Downside of ATM.....	94
	6.11.3: Advantages of Gigabit Ethernet.....	95
	6.11.4: Downside of Gigabit Ethernet.....	95
6.12:	Conclusion.....	95
	6.12.1: New Bandwidth Demand.....	96
	6.12.2: Different Design Goals.....	98
	6.12.3: Gigabit Ethernet: Extending the Domain LAN Technology.....	98
	6.12.4: ATM: Multiservice and LAN/WAN Integration.....	100
	6.12.5: Gigabit Ethernet and ATM: A Place for Each.....	101

6.12.6: Gigabit Ethernet and ATM: Which Goes Where ?.....	102
6.12.6.1: Deploy Gigabit Ethernet Where?	102
6.12.6.2: Deploy ATM Where ?.....	102
6.12.6.3: Consider the Hybrid Model.....	102
6.12.7: A Strong Shared Future in Switching.....	103

CHAPTER SEVEN : FUTURE TREND : GIGABIT NETWORKING

7.1: Introduction.....	104
7.2: Basic Concepts of gigabit Networking.....	106
7.2.1: Fiber Optics.....	107
7.2.2: Cell Networking.....	108
7.3: Routing and Switching Issues on Developing Gigabit Networking.....	109
7.3.1: Basic Routing Functions.....	109
7.3.2: Shortcomings of Routers.....	110
7.3.2.1: High and Variable Latency	110
7.3.2.2: Cost and Performance Issues	110
7.3.2.3: Administration Issues	111
7.3.3: Significance of Routers.....	111
7.3.3.1: Traffic Filtering for WAN.....	111
7.3.3.2: Broadcast Support.....	111
7.3.3.3: Security.....	111
7.3.3.4: Multiple Administrative Domains..	112
7.3.4: Approaches to Solve Routing Issues.....	112
7.3.4.1: Minimizing the Need for Routing...	112
7.3.4.2: Switching / Routing Integration.....	113
7.3.4.3: Improving Routing Performance...	114
7.3.4.4: Improving Router Performance....	114
7.3.4.5: Improving Protocol Efficiency.....	114
7.4: Technologies Supporting Gigabit Networking.....	117
7.4.1: Switching Technology.....	117
7.4.2: IBM's HPR (High Performance Routing)...	118
7.4.3: Gigabit Router.....	118
7.4.4: Routing Switch.....	120
7.4.4.1: Benefits of Routing Switch.....	121
7.4.4.2: Products of Routing Switch.....	122
7.4.5: I/O Switching.....	123
7.4.5.1: Benefits of I/O Switching.....	125
7.4.5.2: Products of I/O Switching.....	126

7.5:	Current Gigabit Technologies Available for High-Speed LAN.....	126
7.5.1:	Asynchronous Transfer Mode (ATM).....	126
7.5.2:	Fiber Channel.....	127
7.5.3:	Gigabit Ethernet.....	127
7.5.4:	Serial HIPPI (High Performance Parallel Interface).....	128
7.5.5:	10 Gigabit Ethernet.....	129
7.6:	Conclusion.....	130
CHAPTER EIGHT :	REFERENCES.....	132

List of Tables :-

Table	Description	Page
Table 1	LAN Emulation Components.....	38
Table 2	LANE Control Connections.....	40
Table 3	LANE Data Connections.....	40
Table 4	LANE Operations.....	41
Table 5	Gigabit Ethernet 1000Base Nomenclature.....	70
Table 6	Gigabit Ethernet Comparison Summary.....	70
Table 7	Summary of Applications Driving Network Growth.....	72
Table 8	Network Backbone Connection Prices.....	73
Table 9	Gigabit Ethernet Performance.....	74
Table 10	The Five Most Likely Upgrade Scenarios.....	77
Table 11	New Bandwidth Drivers.....	96
Table 12	Ethernet and Other Services.....	99
Table 13	The functions of Each Component of a General High-Speed Routers.....	119
Table 14	Silicon Approach vs General-Purpose with Caching Approach.....	120

List of Figures :-

Figure	Description	Page
Figure 2.1	ATM Interface Specifications Differ for Private and Public Networks.....	6
Figure 2.2	An ATM Cell, UNI Cell and ATM NNI Cell Header Each Contain 48 Bytes of Payload.....	7
Figure 2.3	VC Concatenate to Create VPs.....	9
Figure 2.4	The ATM Reference Model Relates to the Lowest Two Layers of the OSI Reference Model.....	11
Figure 2.5	ATM Integrated Services.....	13
Figure 2.6	AAL 1 Prepares a Cell for Transmission so that the Cells Retain their Order.....	14
Figure 2.7	AAL 1.....	14
Figure 2.8	AAL 2.....	15
Figure 2.9	AAL 3/4.....	16
Figure 2.10	AAL 5.....	17
Figure 3.1	The Gigabit Ethernet Protocol Stack was Developed from a Combination of the Fiber Channel and IEEE 802.3 Protocol Stacks.....	19
Figure 3.2	Architectural Model of IEEE 802.3z Gigabit Ethernet.....	20
Figure 3.3	The Gigabit Ethernet Draft Specifies these Distance Specifications for Gigabit Ethernet.....	23
Figure 3.4	Displays the Function of the GBIC Interface.....	25
Figure 3.5	Field of the IEEE 802.3 / Ethernet Frame Format.....	28
Figure 4.1	A Private ATM Network and a Public ATM Network both can carry Voice, Video and Data Traffic.....	33
Figure 4.2	An ATM Network Comprises ATM Switches and End Points.....	35
Figure 4.3	Conceptual Views of LAN Emulation.....	42
Figure 4.4	LAN Emulation for Migrating Legacy LANs.....	44
Figure 4.5	Physical and Logical Views of Multiple Emulated LANs.....	45
Figure 4.6	ATM in the Campus and WAN.....	49
Figure 4.7	ATM in the Building Backbones, Workgroups and Server Farm.....	51
Figure 4.8	ATM Enable Broadband and Multimedia Applications.....	63
Figure 5.1	CSMA/CD Flow Chart.....	69
Figure 5.2	Gigabit Ethernet Performance.....	73
Figure 5.3	Upgrading Switch-to-Switch Links.....	76
	Switch-to-Switch Connections	
Figure 5.4a	Original Networks.....	77
Figure 5.4b	Upgraded Networks.....	78
	Switch-to-Server	
Figure 5.5a	Original Networks.....	79
Figure 5.5b	Upgraded Networks.....	79
	Switched Fast Ethernet	
Figure 5.6a	Original Networks.....	80
Figure 5.6b	Upgraded Networks.....	81
	Building Backbones	
Figure 5.7a	Original Networks.....	81
Figure 5.7b	Upgraded Networks.....	82

	Campus Backbones	
Figure 5.8a	Original Networks.....	82
Figure 5.8b	Upgraded Networks.....	82
	High Performance Workgroups	
Figure 5.9a	Original Networks.....	84
Figure 5.9b	Upgraded Networks.....	84
Figure 6.1	ATM and Gigabit Ethernet.....	101
Figure 7.1	Reflection a Refraction of Light.....	107
Figure 7.2	Fiber Structure.....	107
Figure 7.3	The concept of Cells and Packets.....	108
Figure 7.4	Shared vs Switched on 10 Mbps Ethernet.....	117
Figure 7.5	General Structure of a High-Speed Router.....	118
Figure 7.6	Six Networking Configuration at Switching Speeds Made Possible by a Routing Switch.....	123
Figure 7.7	The Comparison between Existing Network and I/O Switching.....	124
Figure 7.8	The Switch-to-Switch Connectivity of Existing Network and I/O Switching.....	125

Chapter 1

Introduction

1.1 Today's requirements of computer networks

Technology alter the office environments so quickly that it's easy to lose sight of explosive changes in the way people work that have taken place over the past decade. The leader of a typewriter industry that had penetrated virtually every office by 1980 saw its sales evaporate as customers shifted to stand-alone personal computers (PCs) with word processing programs and printers. By the mid 1980s, many companies had begun linking together PCs to form networks in order to share equipment and programs.

Communication networks tend to grow over time, both in number of users and in required bandwidth per user. For this reason networks have to provide an increasing amount of total bandwidth. Also new types of applications are being developed and come into use, requiring the network to provide different types of service than before. Multi media type applications are an example of this. These applications need to transport streams of audio and video over the network, with particular real-time and loss requirements. Current computer networks were originally not designed to cope with these kinds of requirements.

The 1990s have seen a proliferation of networks found at a single location (Local Area Networks (LAN)) as well as the growth of Wide Area Networks (WAN) that link corporate networks at several locations regionally, nationally or even globally. Many companies are now planning to adopt a new technology known as Asynchronous Transfer Mode (ATM) and Gigabit Ethernet (GbE) among other technologies such as Fiber Distributed Data Interface (FDDI), Copper Distributed Data Interface (CDDI), Fast Ethernet, Asymmetric Digital Subscribers Line (ADSL) and Cable Modems.

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Chapter 8

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